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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Michael Shepshelovich

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EXAMINER

O'HARA, BRIAN M

ART UNIT

PAPER NUMBER

3644

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/573,570	<b>Applicant(s)</b> SHEPSHELOVICH ET AL.	
	<b>Examiner</b> Brian M. O'Hara	<b>Art Unit</b> 3644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-36 and 38-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-36 and 38-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/20/10, 1/3/11</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. **Claims 1-36 and 38-41 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 30 recite a "tandem close-coupled arrangement" and also recite a "main wing being one of said fore wing and said aft wing". The main wing limitation renders the claims indefinite because it is unclear how a tandem wing configuration can also have a main wing. There is no main wing in a tandem configuration since both wings provide lift.
2. **Claims 38-41** are also rejected for being indefinite because it is unclear how a main wing can be part of a tandem arrangement.
3. **Claims 2-29 and 31-36** are rejected for being dependent upon a rejected base claim.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1-4, 6-20, 36, 38, and 39 rejected under 35 U.S.C. 103(a) as being unpatentable over Delanne (US Patent 2,147,968 A) in view of Cox et al. (US**

**Patent Application Publication 2003/0155463 A1) and Kora Kit (Released in 2002, see attached NPL, <http://www.fantastic-plastic.com/MilesM35Page.htm>).**

6. Regarding independent **Claim 1**, Delanne discloses an aircraft configured for aerodynamic flight at Reynolds numbers in the range between about 20,000 and about 300,000 (at least some portion of the aircraft would have a characteristic length to calculate the Re in that range), and comprising a fore wing (1) and an aft wing (2) in tandem close-coupled arrangement (See Fig. 2), wherein said aft wing has side panels (7) and control surfaces (6) on at least one of said aft wing and said side panels, and tapered planform with positive sweep (See Fig. 2), said fore wing has non-positive trailing edge sweep (See Fig. 2), the fore wing and aft wing being disposed at different heights (See Figs. 1 and 3), and said arrangement being free of additional wings or tail arrangement, said Reynolds numbers being based on a characteristic chord length of a main wing of said UAV, said main wing being one of said fore wing and said aft wing. Delanne does not disclose the aircraft arrangement being a micro or mini UAV. Cox et al. teaches an aircraft arrangement which comprises a tandem close-coupled wing arrangement (314+316) and is a mini or micro UAV (See Figs. 2A-2C; "L" is about 40 inches; See Paragraph [0012]). At the time of invention, it would have been obvious to one of ordinary skill in the art to make the aircraft of Delanne a mini or micro UAV configured for flight in the Reynolds number range of between about 20,000 and 300,000 and between about 10m/s to about 20m/s, in view of the teachings of Cox et al. The motivation for doing so would have been to create an aircraft which can be handled

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in the battlefield (sizing of Cox et al.) yet has high load carrying capabilities and maneuverability (arrangement of Delanne).

7. The Kora Kit discloses creating a 1/72 scale model of a full size Miles M.25 Libellula aircraft. Further, examiner takes official notice that it is well known in the art to make radio controlled aircraft which are scale models of full size aircraft. At the time of invention, it would have been obvious to one of ordinary skill in the art to resize the Delanne aircraft to be a scaled down size of the full size aircraft configured for flight in the Reynolds number range of between about 20,000 and 300,000 and between about 10m/s to about 20m/s in view of the teaching of the Kora Kit and to make the scale sized aircraft an unmanned [Radio Controlled] aerial vehicle. The motivation for doing so would have been to participate in the hobby of RC aircraft.

8. With regard to **Claims 2-4 and 6-7**, Delanne discloses: the fore wing having straight trailing edges with negative sweep angle (See Fig. 2); the fore wing having negative sweep (See Fig. 2); a fuselage (3); the fore wing being disposed higher than said aft wing at least by the length of an average aft wing chord (See Fig. 3); and the fore wing and aft wing partially overlap each other (See Fig. 4).

9. With regard to dependant **Claims 8-9**, Delanne discloses a tandem arrangement wherein: the sum of the planform wing areas of said tandem arrangement is at least 70% of the product of  $W \times L$  (See Figs. 4 and 6; the combined planform wing area is about 100% of  $W \times L$ ); the forewing, aft wing and other elements are disposed to provide longitudinal aerodynamic stability (See Column 4, Lines 34-34).

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10. Regarding **Claim 10**, Delanne discloses an aircraft wherein at zero lift the aircraft would experience a positive, nose up, pitching moment because of a larger wing planform in the forward position (See Fig. 2) with that fore wing having a non-positive trailing edge sweep.

11. With regard to dependant **claims 11 and 12**, the fore wing and aft wing have rounded tips (See Fig. 2), at least a portion of the aft wing has negative or positive sweep angle (See element 2 in Fig. 6).

12. With regard to dependant **Claims 13-15**, Delanne discloses the aircraft arrangement wherein: the aft wing (2) has aspect ratio between 2.5 and 4; the fore wing (1) has aspect ratio between 3 and 5; planform areas of the aft wing and the forewing are in ratio between 2:1 and 1:1 (See Fig. 6).

13. With regard to dependant **Claims 16-19**, Delanne discloses an aircraft arrangement wherein: said control surfaces comprise rudder control surfaces (9) on said side panels (7); the fore wing has side panels (8) with rudder control surfaces (7) on it's side panels and control surfaces (6).

14. Regarding **Claim 20**, Delanne discloses a tractor propeller (12).

15. Regarding **Claim 36**, Cox et al. discloses the size of the UAV to have a fuselage length of about 40 inches which is about equal to 100 centimeters. At the time of invention, it would have been obvious to make the UAV of Delanne and Cox et al. as described above a mini-UAV having at least one of a maximum longitudinal length and a maximum wingspan between about 20cm and about 1.2m. The motivation for doing

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so would have been to make the UAV lightweight and backpackable (See Paragraph [0006] of Cox et al.) in view of the teaching of Cox et al.

16. Regarding **Claims 38 and 39**, Delanne discloses said characteristic chord is an average chord taken between a root and a tip of said main wing (applies for either wing 1 or 2) and said main wing is said aft wing (See element 2 in Figs. 4-6).

17. **Claims 21, 22, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delanne and Cox et al. as applied to claim 1 above, and further in view of Cox '398 (US Patent 6,626,398 B1).** Delanne and Cox et al. disclose the UAV as described above but do not disclose the specifics of the wing characteristics. Cox '398 teaches a UAV aircraft arrangement wherein: at least one of said fore wing and aft wing has non-zero dihedral angle (See Table 1); the dihedral angles of the fore wing and of the aft wing are such that the vertical distance between wing tips of said fore wing and said aft wing is greater than the vertical distance between their respective wing roots (See Table 1;  $-10^\circ$  anhedral forward wing and  $-10^\circ$  dihedral rearward wing); and the aft wing has positive angle of incidence and a section with positive zero lift pitching moment (See Table 1; angle of attack  $-2^\circ$  to  $+2^\circ$ ). At the time of invention, it would have been obvious to one of ordinary skill in the art to apply dihedral, diverging fore and aft wings, and positive angle of incidence to the UAV of Delanne and Cox et al. described above and further in view of the teaching of Cox '398.

18. **Claims 5, 23, 24, and 27-29 rejected under 35 U.S.C. 103(a) as being unpatentable over Delanne, Cox et al. and Cox '398 as applied to claims 1 and 4 above, and further in view of Fraser (US Patent 3,954,231 A).** Delanne, Cox et al.,

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and Cox '398 disclose a Mini or Micro UAV as described above. Fraser teaches a tandem wing aircraft configuration wherein: the fore wing is mounted on the upper side of the fuselage on at least one pylon (See pylons in Fig. 4); the fore wing and aft wing have twist (See separate wing sections in the wings of Fig. 11). With regard to claims 27-29, Fraser teaches a fighter type aircraft (See Fig. 6). It is well known to provide longitudinal aerodynamic instability in these types of aircraft to improve maneuverability. Additionally a pusher propeller is shown in Fig. 10. At the time of invention, it would have been obvious to one of ordinary skill in the art to provide the aircraft arrangement of Delanne, Cox et al., and Cox '398 as described above with the pylon, wing twist, and stability characteristics of Fraser. The motivation for doing so would have been to meet the flight requirements with respect to maneuverability and range for the UAV.

19. **Claims 30, 31, 32, 34, 40, and 41 are rejected under 35 U.S.C. 103(a) as obvious over the Miles Aircraft Libellula M.35 (please see non-patent literature supplied 02/26/2010) in view of Kora Kit (see attached NPL).**

20. Regarding **Claim 30**, the Libellula M.35 design discloses an aircraft configured for aerodynamic flight at Reynolds numbers in the range between about 20,000 and about 300,000 comprising a fore wing and an aft wing in tandem (same wing span) close-coupled (top view shows them close together) arrangement, wherein said aft wing has side panels (Side panels located just aft of cross section CC) and control surfaces on at least one of said aft wing (elevators on the aft wing) and said side panels (rudders on side panels), and tapered planform with positive sweep, said fore wing has non-positive trailing edge sweep, the fore wing and aft wing being disposed at different



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heights (forewing is higher), and said arrangement being free of additional wings or tail arrangement (only has vertical stabilizers on aft wing), and wherein a planform area of the aft wing is not less than a planform area of the fore wing. But does not disclose the aircraft being a mini or micro UAV. The Kora Kit discloses making a scale model of a Miles M.35 Libellula which would be the size of a mini or micro UAV. Additionally, examiner takes official notice that it is well known in the art to make flying scale models of full size aircraft either for recreational use or for testing purposes. At the time of invention, it would have been obvious to one of ordinary skill in the art to create a flying scale model (i.e. UAV) of the Miles Aircraft Libellula M.35 which is configured for flight in the Reynolds number range of between about 20,000 and 300,000 and between about 10m/s to about 20m/s, and where said Reynolds numbers being based on a characteristic chord length of a main wing of said UAV, said main wing being one of said fore wing and said aft wing. The motivation for doing so would have been to create a recreational or RC hobby aircraft.

21. Regarding **Claim 31**, the Libellula M.35 design discloses an aircraft arrangement wherein the planform areas of the aft wing and the fore wing are in ratio between 2:1 and 1:1 (Figures show the aft wing to be larger).

22. Regarding **Claim 32**, the Libellula M.35 design discloses an aircraft arrangement except for the tandem arrangement is at least 70% of the product of  $W \times L$ . It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the sum of the planform wing areas be at least 70% of the product of the  $W \times L$  because a large aspect ratio reduces drag and increases performance in low speed

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flight, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

23. Regarding **Claim 34**, the Kora Kit discloses the max longitudinal length and max wingspan to be about 3.5 in.

24. Regarding **Claims 40 and 41**, the Libellula M.35 design discloses said characteristic chord is an average chord taken between a root and a tip of said main wing (applies for either wing) and said main wing is said aft wing (aft wing is larger).

25. **Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Libellula M.35 in view of Kora Kit as applied to claim 30 above, and further in view of Warsop et al. (US Patent 6,607,162 B2).** Libellula M.35 and Cox et al. disclose the mini-UAV as described above, but do not disclose a maximum longitudinal length and a maximum wingspan not greater than about 15cm. Warsop et al. teaches scaling of a UAV to any size, including micro UAVs of 150mm or less (See Column 1 Lines 10-24). At the time of invention, it would have been obvious to one of ordinary skill in the art to make the aircraft of Libellula M.35 and Cox et al. with a longitudinal length and a maximum wingspan not greater than about 15cm in view of the teaching of Warsop et al. The motivation for doing so would have been to make the aircraft small and light; suitable for short efficient missions.

26. **Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Delanne in view of Cox et al. and Kora Kit as applied to claim 1 above, and further in view of Warsop et al. (US Patent 6,607,162 B2).** Delanne, Cox et al., and Kora Kit,

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disclose the mini-UAV as described above, but do not disclose a maximum longitudinal length and a maximum wingspan not greater than about 15cm. Warsop et al. teaches scaling of a UAV to any size, including micro UAVs of 150mm or less (See Column 1 Lines 10-24). At the time of invention, it would have been obvious to one of ordinary skill in the art to make the aircraft of Delanne and Cox et al. with a longitudinal length and a maximum wingspan not greater than about 15cm in view of the teaching of Warsop et al. The motivation for doing so would have been to make the aircraft small and light; suitable for short efficient missions.

### ***Response to Arguments***

27. Applicant's arguments filed 12/20/2010 have been fully considered but they are not persuasive.

28. On Page 12 through Page 14 Line 15 applicant argues that the combination of Delanne and Cox et al. does not definitely disclose a Mini or Micro UAV. Cox et al. shows a box for accommodating the full length of the fuselage of the UAV in Fig. 2. The length of the box is disclosed as being 40 inches long in Paragraph [0012] of Cox et al. Additionally, as is shown in Fig. 4c of Cox et al., the wingspan is approximately the same as the length of the fuselage. Therefore the fuselage must be less than 40 inches to fit within the box and the wingspan must be approximately the same length as the fuselage based on Fig. 4c. Applicant has described in their specification that a Mini UAV can be between 20cm to 1.2m. 1.2m is approximately equal to 47 in. Therefore the 40

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in. size of the Cox et al. aircraft is within the range of a Mini UAV as described by applicant's specification.

29. On Page 14, Line 16 through Page 20, Line 13 applicant argues that it is non-obvious to use the configuration of Delanne as a UAV configured for flight speeds between 10m/s and 20m/s and with Re numbers between 20,000 and 300,000 in view of Cox et al. Applicant further discloses a website which teaches the commonly known methods which have been developed for creating flying scale models of full sized aircraft. The Examiner agrees that with the provided reference that there are well known methods to make scale models of full sized aircraft. Therefore it is obvious to take the configuration of Delanne and make a small scale flying model for operating in the flight regime corresponding to flight speeds between 10m/s and 20m/s and with Re numbers between 20,000 and 300,000.

30. On Page 20, Line 14 through Page 22, Line 12 applicant argues that Dellane does not disclose the limitations of Claims 7 and 8. As is clearly shown in Fig. 6, Dellane shows a fore wing with non-positive trailing edge sweep, since wing (1) is shown with a curved trailing edge, and the aft wing is tapered with positive sweep, since the leading edge of wing (2) is curved rearwardly. Further as indicated by Figures 4 and 7, if a plan view were shown, the wings would overlap since the wings are shown to overlap in the side views. Additionally, since the wings overlap at least 70% of the product WxL would be filled with wing planform area. Finally, since Dellanne discloses multiple embodiments it would have been obvious to use the modifications shown in

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Figures 7 and 8 on the aircraft of Figures 1-3, since Dellanne discloses the further embodiments as modifications; See Column 2 of Page 2, Line 10.

31. On Page 25, Line 8 through Page 26, Line 2 applicant argues that the Libellula does not disclose a close coupled arrangement because the average gap between the trailing edge of the fore wing and the leading edge of the aft wing is less than the fore wing root chord. This is not found to be commensurate with the scope of the claims. At least the root of the fore is close to the root of the aft wing therefore placing them in a close-coupled tandem arrangement.

### ***Conclusion***

32. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian M. O'Hara whose telephone number is (571)270-5224. The examiner can normally be reached on Monday thru Friday 10am - 5pm except the first Friday of every Bi-week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy D. Collins can be reached on (571)272-6886. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOSHUA J MICHENER/  
Primary Examiner, Art Unit 3644

/B. M. O./  
Examiner, Art Unit 3644